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Socioeconomic impact of livestock production in Gokuleshwor, Baitadi, Nepal

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Abstract

The study was conducted in the Dilashaini rural municipality of Baitadi district. The study area was primarily based on agriculture. Farmers in the studied area adopted a complex type of farming system that includes livestock, crops, fruits, forestry, and vegetable farming. This study was mainly conducted to identify key problems faced by farmers and the socioeconomic importance of livestock farming. A key informant interview was conducted among randomly selected respondents with semi-structured questionnaires. 61 households were randomly selected without the replacement method. The results showed that most of the households were headed by men (52 households). The primary occupation was agriculture (72%), followed by business (22%). The benefit-cost ratio was found to be 1.65. The cost per liter of milk was 48.08 rupees. We found feeding management to be the main problem. Farmers invest a huge amount of their income in managing feed for livestock. Natural breeding was largely prevalent in the study area (96%); artificial insemination was still rare. In the studied area, the dairy sector was profitable, so it emphasized improved breeding programs, improved feeding management, and the establishment of well-managed dairy cooperatives, which helped in the development of the rural economy and the lifestyle of farmers.

Keywords: Benefit Cost ratio, Dairy sectors, Feed management Livestock farming, Socioeconomic impact

Introduction

The livestock is an integral part of Nepalese economy and lifestyle. It is one of the fastest-growing agricultural sub-sectors and it is a principal source of food and employment. Agriculture sector contributes 24.1% in gross domestic product (GDP) of Nepal, which is estimated grow up to 2.73%. Agriculture and livestock production also plays significant role to increase per capita income of country, Nepal is considered as developing country with per capita income of \$1027. Minimum requirement of livestock product is more than availability as, requirement of milk is 91 liter per person per man, meat requirement high where minimum requirement is 14kg and availability is 21kg (Economic Survey, 2023) ^[10]. Livestock production contributes 24.01% on agriculture gross domestic product. Raw cattle milk contributes 3.9501% and raw buffalo milk contributes 7.28%, goat farming contributes 3.95%, meat of buffalo contributes 4.23% on AGDP (MoALD, 2023) ^[26]. Milk is fluid produced by mammary gland of mammal, primarily to meet the complete nutritional requirements of neonate. The body needs energy (from lipids and lactose), essential amino acids, amino groups for biosynthesis of non-essential amino acids (from proteins), vitamins, inorganic elements, and water (Goh *et al.*, 2014) ^[13]. Milk contains about 87.2% water, 3.7% fat, 3.5% protein, 4.90% lactose, 0.7% ash, 9.1% fat free solid residue, and total solid 12.8% on average nutrient content (Kourkouta Lambrini *et al.*, 2020) ^[22].

Livestock and poultry populations have continuously been increasing in the last decade in Nepal and are likely to follow that trend as the interests in this field is growing. The livestock sector is a principal source of food and employment (Poudel *et al.*, 2020) ^[29]. In the developing world, including Nepal and other Asian regions, livestock is a primary source of major dietary nutrients and a critical component of small-scale crop livestock mixed farming systems (Khanal *et al.*, 2022) ^[19]. The demand for livestock products is projected to increase in developing regions due to a rise in urbanization and income levels.

Livestock production has significant variation on source of income generation mostly raw milk, butter, meat, and manure can be utilize (Br *et al.*, 2018) [3]. In Nepal, the livestock sector is seemed essential to alleviate poverty and improve the nutritional status of the population. Livestock rearing, which was a way of life in the past, is now assuming the form of gainful business occupation (Pradhanang *et al.*, 2015) [30]. Livestock production and dairy development has been viewed by planner and policy maker as an effective instrument of social and economic change in the rural area, as they provide employment to the weaker section and thereby help them in augmenting their income. The livestock, thus, make large contribution to the development of rural economy and help the rural masses to improve their standard of living (Davies *et al.*, 2010) [7].

Livestock farming is profitable for small stakeholder on terai region of far-western Nepal. Livestock farming give significant contribution on rural economy. Far-western region has substance type of livestock farming, rural area contains at least one productive animal for milk production (Bhandari, 2020) [2]. Milk production contributes on diet management, rural area population are self-dependent upon milk production and organic manure for crop cultivation then urban population. Rural place population are mostly depended upon agriculture and livestock production as major source of income (Khanal *et al.*, 2022) [19]. Far western region of Nepal is considered as the least developed as compare to eastern part of Nepal on agriculture modification and improved farming technology. Low land holding of farmers is the major constraint of livestock farming in Nepal. Extensive system for livestock farming should be adopt by farmers to manage the feed management constraint, agroforestry parturition has great potential in far-western region as there are many grazing green land are present (Kingdom, 2017) [20]. Livestock farming also helps significantly on poverty alleviation as 79% of rural

household are involved in mixed farming system as they generate income from both crop cultivation and livestock farming (Jha & Polytechnic, 2019) [15]. Due to high population of Hindu and their belief on worshiping cow as God, cow is also national animal of Nepal, there is less population of productive cattle as compare to productive buffalo population which significantly effect on the productivity of livestock, the population of cattle is high than buffalo in Nepal (Ghimire & Pandeya, 2021) [12]. There is more indigenous breed in Nepal as compare to high yielding improved breed which also affect significantly on productivity of livestock (Khanal *et al.*, 2022) [19]. In USA, production of livestock was improved by technological advancement, genetic enhancement, and improved system of livestock farming. In United Kingdom, extensive system livestock farming contributes significantly on production livestock. Livestock trade is important component of agriculture globally (Papakonstantinou *et al.*, 2024) [28]. The Dairy Cattle Improvement Program (DCIP) resulted in a 300-day milk output of 2735 ± 38.7 kg from jersey cattle crossbreeds. About 36% of buffaloes are cross-bred. Crossbreeding has the ability to develop high producing bovines in Nepali indigenous breeds (Kamlesh and Trivedi, 2019) [18].

This study is aimed to investigate the socioeconomic impact of livestock farming on rural economy. Livestock farming play's important role in rural economy, to know different ways of management practice followed by farmers in studied area. To study livestock contribution for farmers income, cost effective production of livestock of rural pace of Nepal. To study the major problem of livestock farming and satisfaction level of farmers.

Methods and Methodology

Study area

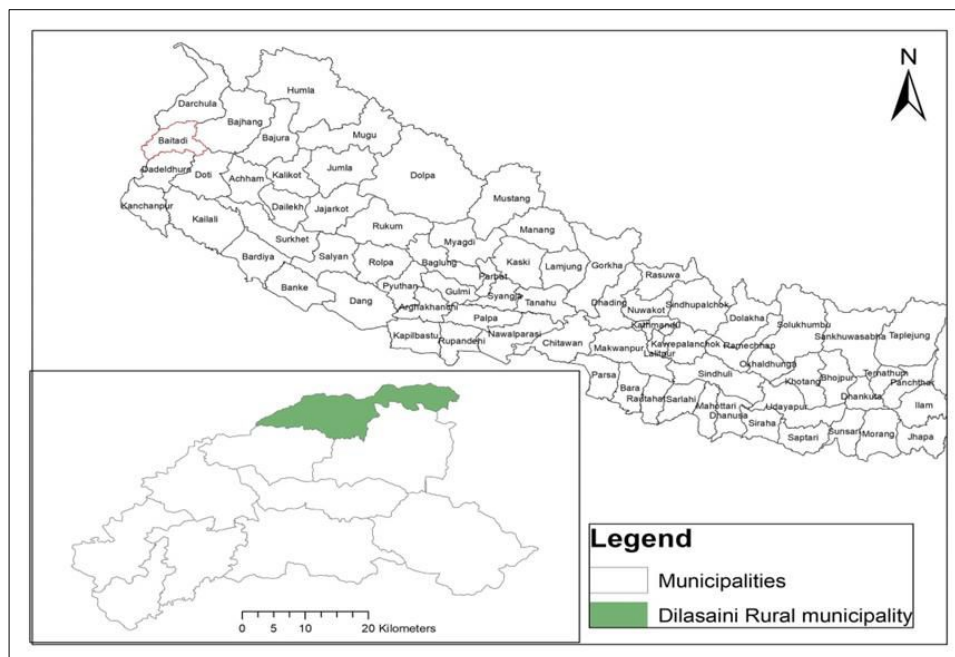


Fig 1: Map of Nepal including studied area.

Dilashaini rural municipality, Baitadi is a hilly district in province no. 7 (Sudurpaschim province) of the country Nepal touching Jhulaghat, India to its border of Nepal. For

our study, we randomly selected ward no. 5 and ward no. 6 of Dilashaini rural municipality as all the people in this region are involved in farming. Livestock rearing is a

common and dominant practice in the study area as rearing of cattle and buffalo can be easily spotted.

Table 1: Feature of the study area

Features	Description	References
Ecological zone	Mid-hill	(Climate Data, 2024) [6]
Altitude	1927m	(Climate Data, 2024) [6]
Population	22,966	(CBS, 2021)
Literacy rate	76.7%	(CBS, 2021)

Research design and data collection

A random sampling survey was conducted by using without replacement technique as respondents and study areas were selected randomly. A total of 61 households were selected to collect information. Also, a key informant interview was conducted among randomly selected respondents with semi-structured questionnaires to know the validity of the questions. Constraints were added from pilot testing in the study area based on problems faced by respondents. Pilot testing was done with 10 respondents who were not included in the final survey. The survey was conducted from the 1st of December to the 5th of December 2022. Data collection was done by face-to-face interview as it is the most suitable and transparent method.

Statistical analysis

Microsoft Excel 2013 was used for data entry and IBM Statistical Package for Social Science (SPSS v.21.0) was used to analyze descriptive statistics. Descriptive statistics include the calculation of mean, frequency, and standard deviation.

Results and Discussion

Socio-demographic characteristics

Average age and gender of household heads

In total, 61 households were interviewed and the average age of the household head was 48 years whereas according to (Malla *et al.*, 2021) [25], the average age was found to be 49.25 years which is quite similar with our result for gender of household head. The results obtained from descriptive statistics revealed that 52 household heads were male and 9 where female since male members were in India for employment to support family expenses. The patriarchy in Nepalese society is widespread, a similar result was found in (Thapa *et al.*, 2020) [36]. 81.8% were male-headed households whereas 26.3% were female-headed as recorded by (FAO, 2012) [11].

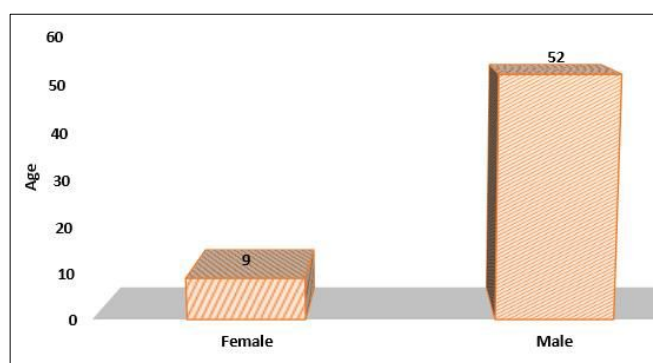


Fig 2: Gender of household heads.

Maritals status of household heads

The figure indicates that 75% of the household heads were married whereas 25% were unmarried. According to FAO (2012) [10], 33.6% of the population in the study area were unmarried and among them, 37.7% were male and 29.8% were female. Whereas 61.5% were married and among them, 60.2% were male and 62.8% were female.

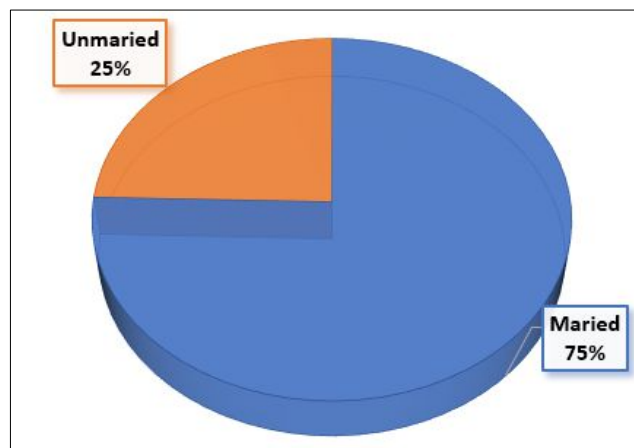


Fig 3: Marital status of household heads.

Family type of sampled households

Two types of family types were reported in the study area viz. joint and nuclear family. 80% of the households have a nuclear family and in 20% joint family has been reported. Nuclear families predominate in Dilashaini, Baitadi as a result of economic migration to urban areas in search of better employment opportunities, changing social norms favoring independence, limited housing space, and the younger generation's focus on education and career, all of which encourage smaller, self-sufficient household units. But according to (Devkota & Bhatta, 2018) [9], Joint family type was found to be predominant in the Baitadi district.

Table 2: Family type of sampled households in study area.

Family type	Percentage
Joint family	14 (20)
Nuclear family	47 (80)
Grand Total	61 (100)

Average family size of respondents

The average family size of respondents in the surveyed area was 5.97. The average national household size was 4.37 CBS (2021a). (Malla *et al.*, 2021) [25] found an average family size of 7.89, the highest reported compared to another research. Education status of respondents. The education status of the respondents was classified in five categories based on schooling year (Table 2). From the survey it has been found that only 10% of the respondents were illiterate and among the literate members 16% have attained primary level, 51% have attended secondary level and 6% have attended to bachelors and 13% to the university. During a function held in the area on Friday, Baitadi was formally declared the literate district. The district is divided into ten local entities. By mid-June 2018, all of the local units had been certified as literacy rates. According to the Education Development and Coordination Unit, the district's literacy rate is 96.53 percent

Education status of respondents

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literacy rate was 76.6% (CBS, 2021). During a function held in the area on Friday, Baitadi was formally declared the literate district. The district is divided into ten local entities. By mid-June 2018, all of the local units had been certified as literacy rates. According to the Education Development and Coordination Unit, the district's literacy rate is 96.53 percent (Chand & Bhatt, 2024)^[5] Many people even lack the ability to make decisions regarding their daily lives, finances, and other areas of research.

Table 3: Education status of respondents in study area.

Level of education	Count of Level of education
Illiterate	6 (10%)
Primary	10 (16%)
Secondary	31 (51%)
Bachelor	4 (6%)
University	9 (13%)
Grand Total	61 (100)

Primary occupation of respondents

Agriculture is the major occupation of the study area followed by business and service in the government and private sector as shown in the figure 4. Nearly 30 million people live in Nepal, an agricultural nation with a variety of natural zones. Of these, 57.3%, or 50.6% of men and 64.8% of women, work in agriculture. The foundation of Nepal's economy, agriculture generates jobs, accounts for 24.1% of

GDP, and supports livelihoods (Krishi Diary, 2024)^[21]. In rural Nepal, agriculture is the primary source of income for households. However, it is still subsistence farming, carried out on small, low-productivity plots of land. As a result of the seasonality of agriculture, rural households also engage in temporary work for little financial gain (Prakash & Lall, 2012)^[31].

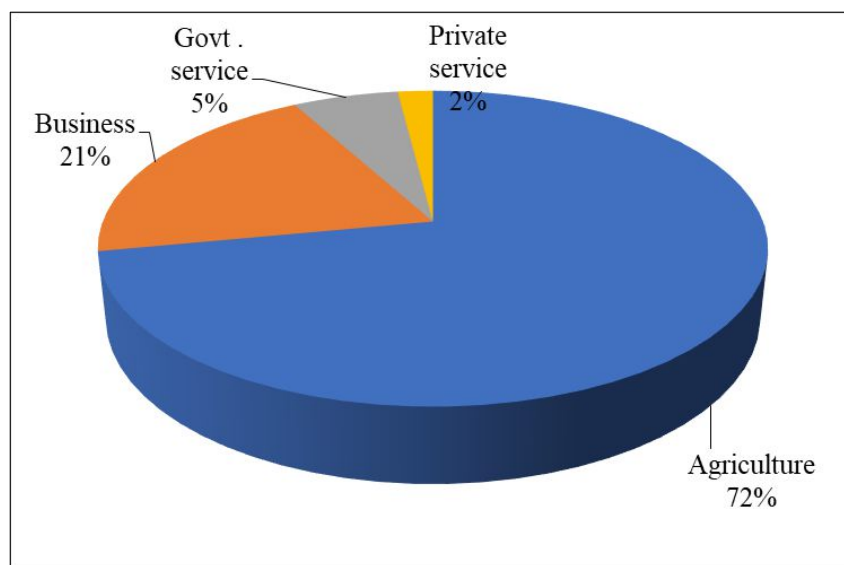


Fig 4: Primary occupation of respondents in study area.

Distribution of landholding of respondent's household

The landholding has been classified as irrigated, non-irrigated, and non-cultivated based on the irrigation and cultivation status (Table 4); the first two are cultivated and the latter one is fallow land or marginal land used for grazing purposes. Average landholding of respondent's household= 0.38 hectare. As per CBS (2021), the mean land area owned by farmers was 0.54 hectare (ha).

Table 4: Distribution of landholding of respondent's household in study area

Types of landholdings	Area (ha)
Irrigated	0.17
Non irrigated	0.14
Non cultivated	0.07

Distribution of livestock holding of respondent's household

To determine the various livestock possessed by respondents per household, the average livestock population was calculated in Livestock Standard Unit (LSU) = 1(cow/bull) +1.5(buffalo) +0.4(goat/sheep) +0.6(swine/pig) +0.2(poultry) (Joshi *et al.*, 2023)^[16].

$$\text{Livestock Standard Unit (LSU)} = (2.05 \times 1.5 + 2.17 \times 1 + 0.41 \times 0.6 + 4.98 \times 0.4 + 1.8 \times 0.2) = 8.84$$

Income characteristics of respondent's household

The study area's economy is based mostly on agriculture, which generates 46% of total revenue from sales of crops (24%) and animals (18%). However, a variety of sources of income support the community's economic stability. Dairy

farming is important since milk sales account for 24% of household income, which is a critical role. In addition to agriculture, remittances from family members living overseas provide much-needed financial support, while local services and job opportunities increase the variety of sources of income. This multifaceted strategy improves overall economic stability in addition to stabilizing household incomes against agricultural uncertainty. The greatest average income comes from a salaried job, which is

followed by remittances, while the lowest amount comes from labor (Maharjan & Joshi, 2007) ^[24]. According to (Shah *et al.*, 2023) ^[35], Agriculture represented 96.71% of the farmer population, while office employment comprised 3.09% in the mid-hill of Nepal. Based on (Details, 2024; Gupta & Singh, 2019) ^[8, 14], the majority of study respondents were employed in agriculture as compared to other occupations.

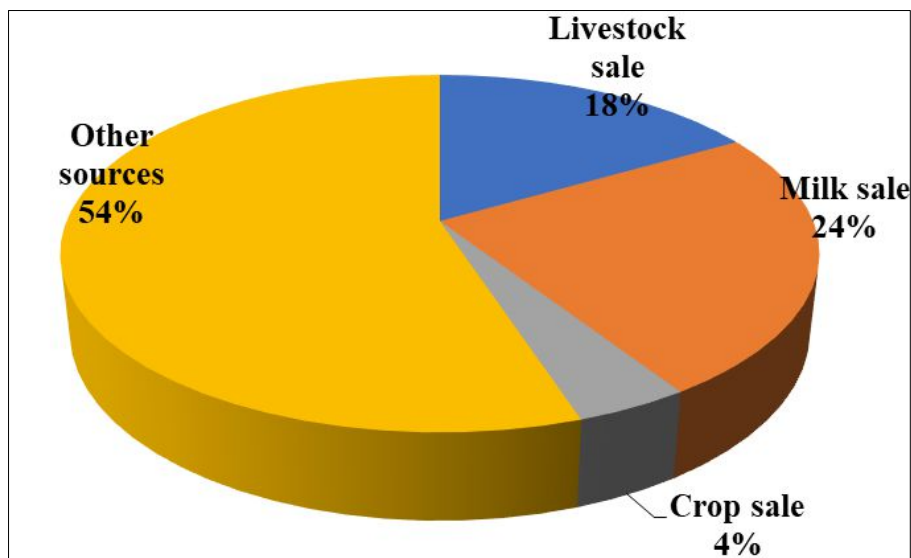


Fig 5: Income characteristic of respondent's household in study area.

Feeding management

From the study area, it has been found that hay was most widely used in feeding followed by straw and only 7 respondents were found to use grazing as fodder. The use of tree fodder, green grasses, and straw constitute a major composition in the dietary pattern of livestock. Due to import constraints of improved feedstock, there's still feed deficit and nutritional deficiency in most livestock in Nepal.

During the dry season, when the quantity and quality of available forages are restricted, fodder trees and shrubs in Nepal's hilly regions are essential for feeding livestock with adequate feed. In the winter season, tree fodders are essential sources of high-quality feed for grazing ruminants and act as supplements to crop residues or low-quality byproducts (Shah *et al.*, 2023) ^[35].

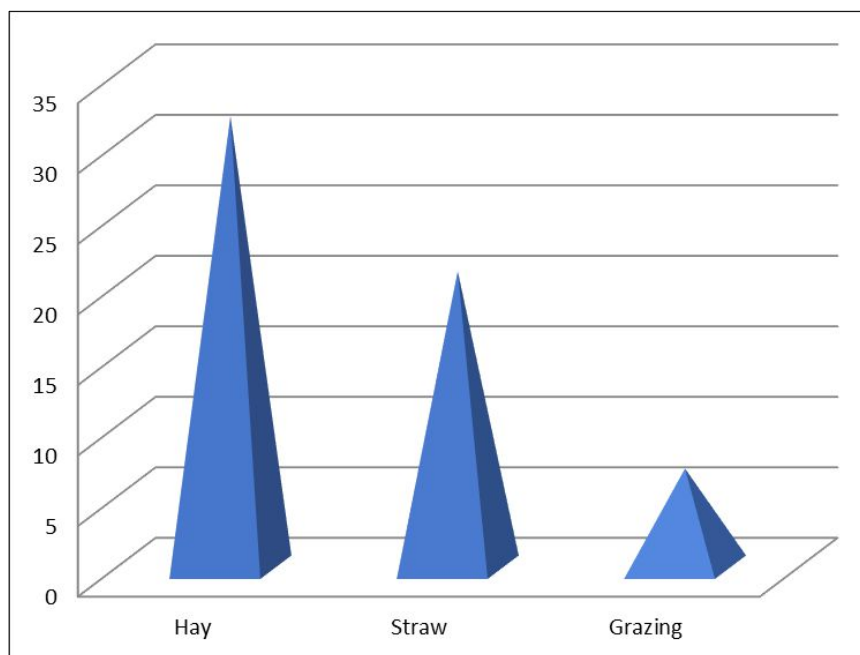


Fig 6: Feeding management in study area.

Availability of breeding system

In the study area rearing of livestock for household demand has been reported from almost all the respondents which showed the subsistence nature of farming and in the case of breeding system selection traditional system of farming can still be seen. Only 6% of the respondents were found to adopt artificial insemination (AI) and the rest 94% are still following the traditional method of natural mating (Figure 7). Nowadays, breeding practices increasingly use artificial

insemination. However, it is relatively low in Nepal, with just 6.30% AI penetration in buffalo till 2020/21 (Devkota *et al.*, 2022).^[9] Most of rural part are out of national livestock breeding center (NLBC) and doesn't receive service from NLBC, although it was started six decades ago. Artificial insemination system is not cost effective, natural breeding system is cheap and easy to access. AI system of breeding helps in genetic improvement program (BGIP) through crossbreeding (Siddiky, 2018)^[33].

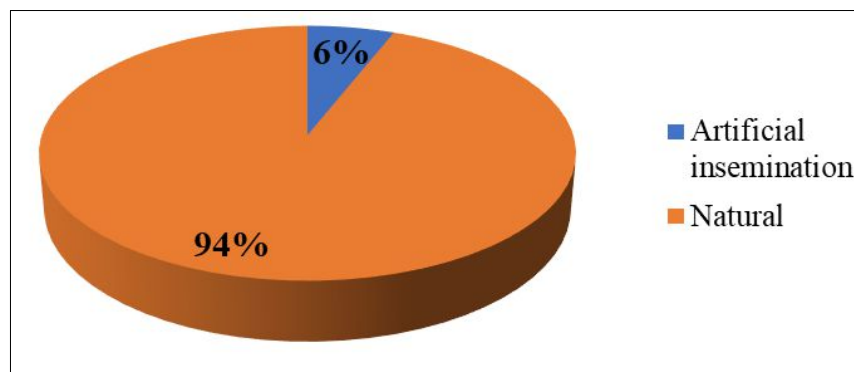


Fig 7: Availability of breeding system.

Total cost, total income, net income, per liter cost and benefit cost rate

For the production function assessment record of the cost of expenditure, total income, net income, and the selling price of farm products are to be recorded fairly. Though accurate bookkeeping was lacking in the study area, farmers' estimation was recorded to assess the status of farm economic condition and operational status of the farm. The total cost of production was Rs. 66056.84 and the total income was Rs. 109554.3. The average net income of the farm was found to be Rs. 43497.46 and the mean farm gate price of milk was Rs. 48.08 per liter (Table 4). Benefit-cost ratio (B/C ratio) analysis suggests that the farm is under the situation of profit and for every Rs. 1 investment return is Rs. 1.65. When the B/C ratio is less than one farm is in loss,

equals one neither profit nor loss and above 1 farm is running under profit. Timsina (2010)^[37] reported that the B/C ratio of large farms was 1.42, medium farms were 1.33 and small farms 18 were 1.23. The B/C ratio of farms was comparatively higher in the study area as compared to Timsina's findings.

Table 5: Total cost, total income, net income, per liter cost and benefit cost rate

Parameter	Amount (Rs.)
Total cost	66056.84
Total income	109554.3
Net income	43497.46
Cost per liter	48.08
B/C ratio	1.65

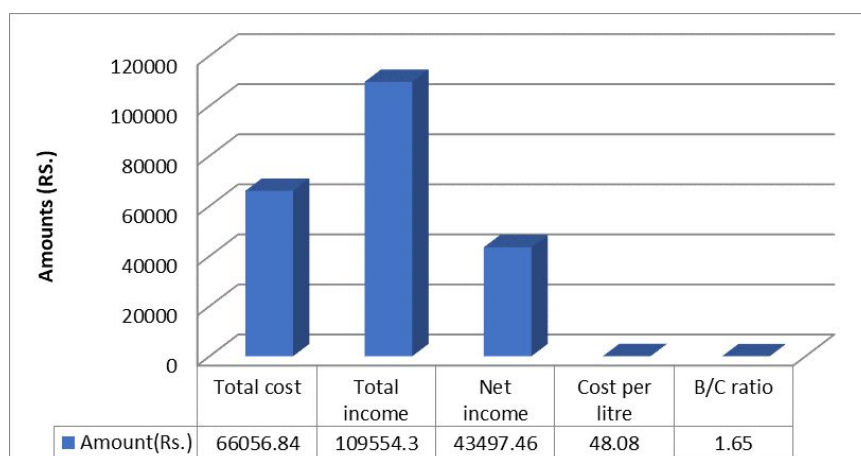
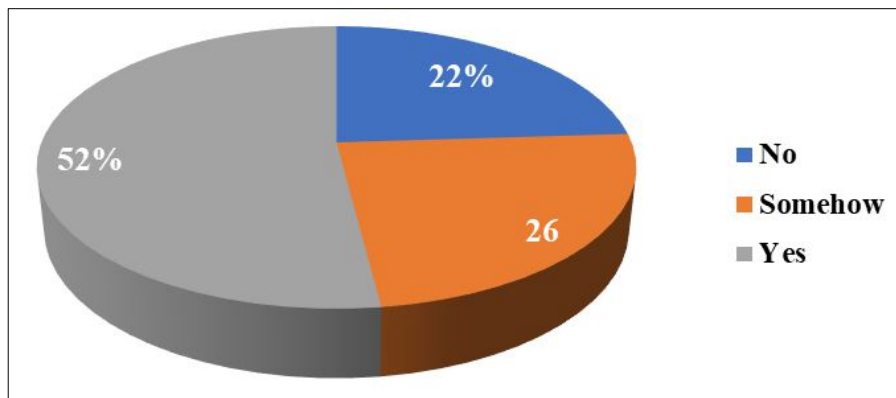


Fig 8: Total cost, total income, net income, per liter cost and benefit cost rate.

Level of satisfaction

Majority of the respondents were found satisfied with their occupation and 26% were found somehow satisfied and remaining 22% were found not satisfied (Figure 9). Livestock sector of Nepal is integral type, livestock sector is facing low productivity and ability to modified to modern commercial farming system through improvement of genetic

potential of productive animal and scientific method of housing system (Khanal *et al.*, 2022)^[19]. Livestock farming is subsistence type, people are self-dependent on dairy product on rural area of Nepal which also improve Socio-economic condition of livestock farming (Sapkota, 2022)^[32].

**Fig 9:** Level of satisfaction**Problem Faced by the Respondents**

A five-point Likert scale was used, a technique for measuring attitudes using several different response formats (Batterton & Hale, 2017) ^[1] to get respondents' opinions on prevailing problems. An index of agreement based on severity was used to rank the constraint as shown in the table. The higher price of input (3.02) was the most severe

problem in the study area which increased the production cost. Accordingly, the unavailability of inputs in time (2.42), the unavailability of improved breeds (1.67), the problem of diseases (1.07), and the lack of credit (0.40) are arranged based on an index of agreement. The higher the value of the index of agreement, the higher the level of the problem and it must be placed before other issues.

Table 6: Problem faced by the respondents

Problems	Index	Rank
High price of input	3.02	1 st
Unavailability of inputs in times	2.42	2 nd
Unavailability of improved breeds	1.67	3 rd
Problem of diseases	1.07	4 th
Lack of credit	0.40	5 th

Conclusion

The study conducted in Dilashaini rural municipality of Baitadi district which lies in far western region of Nepal. Almost all of the family in the study area follow complex type of farming system which includes livestock + crops+ fruits+ forestry + vegetable farming. Patriarchy was reported in the study area where 70% of the males headed the households. Agriculture is the major occupation in the study area. The dairy sector in the study area was of subsistence type and running under a profit condition with B/C ratio 1.65 and cost of production per liter of milk was Rs. 48.08. Still people follow natural breeding for producing the offspring of cattle and buffalo which do not have a good production efficiency (mostly due to inbreeding depression). The milk distribution system was not properly channelized and essence of dairy co-operative in the study area is of utmost importance. Due to geographical constraints cost of feeding input were reported high thus if proper training is given to farmer regarding the feed management and importance of dairy sector in the study area it helps to increasing economic status and lifestyle of farmers.

Ethics approval and consent to participate

Not applicable

Consent for publication: Not applicable.

Declarations**Author contribution statement**

Conceptualization: Dipak Raj Bist; Methodology: Ganesh Raj Joshi; Software and validation: Pawan Chapagae; Formal analysis and investigation: Pawan Chapagae; Resources: Ashmita Mandal, Puspa R.C, Renu Awasthi,

Ramila Rawal, Gita Bist, Rukmini Bohara, Ganesh Raj Joshi, and Dipak Raj Bist.; Writing—original draft preparation: Pawan Chapagae, Dipak Raj Bist, Ashmita Mandal, Puspa R.C, Renu Awasthi, Ramila Rawal, Gita Bist, Rukmini Bohara, and Ganesh Raj Joshi; Writing—review and editing: Dipak Raj Bist; Visualization: Dipak Raj Bist; Supervision: Dipak Raj Bist. All authors have read and agreed to the published version of the manuscript.

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Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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